III. THE COMMISSION SHOULD CLARIFY ITS TELRIC RULES TO ENSURE THAT UNE RATES DO NOT SUBSIDIZE NETWORK CAPABILITIES THAT THE TRIENNIAL REVIEW ORDER DENIES TO UNE PURCHASERS.

As AT&T explained in its initial comments (at 53-55), it is a bedrock principle of ratemaking that charges for regulated services should include only those costs properly attributable to the provision of the regulated services. And, as AT&T explained (*id.*), in the wake of the *Triennial Review Order*, the Commission needs to clarify its TELRIC rules to ensure consistency with that principle. There, the Commission eliminated unbundled access to certain of the "broadband" capabilities of hybrid fiber-copper loops (and also limited the bandwidth available to purchasers of high-capacity loop and transport UNEs). *Triennial Review Order* ¶¶ 273, 288-89, 315, 324, 388-89. In the wake of these changes, the Commission must take steps to ensure that competitive LECs bear only the costs properly attributable to the capabilities of the facilities that they may actually use, and not costs that are attributable to capabilities to which competitive LECs are denied access.

Notably, BellSouth endorses the need for such changes. Under the Commission's new unbundling rules, competitive carriers have access to only a fraction of the full capabilities of hybrid and all-fiber loops. NERA (BellSouth) Decl. ¶ 40. Thus, BellSouth acknowledges that competitive carriers should only be required to pay for the fraction of the costs of those loops that are "attributable" to the narrowband services that competitive carriers can offer over such loops. *Id.*

Only Verizon argues to the contrary. Without any elaboration, Verizon breezily asserts (at 48) that competitive carriers should have to pay the full costs of loop capabilities that they are denied because "the incumbent must bear those costs in order to provide that loop." That is false. The economic cost incurred by the incumbent is the cost of only those facilities that are needed to provide the services that competitive carriers are actually providing over the UNEs that they are using. Thus, to the extent that fiber is being deployed in the local networks to support broadband services, the competitive carrier does not cause those costs when it is purchasing the UNE. And that is why Verizon's own economists have rejected the notion that narrowband users of the networks should bear any of the costs of investments used to provide broadband services. Alfred Kahn, *How to Treat the Costs of Shared Voice and Video Networks in a Post-Regulatory Age*, Policy Analysis, No. 264, at 6 (Nov. 27, 1996).

Moreover, it is questionable whether the Bells incur *any* significant incremental capital costs to provide UNEs. By Verizon's own admission, it provides UNEs only on a space-available basis. When filling a CLECs request for UNEs would require substantial investment, Verizon refuses to provision the UNE. In Verizon's own words, "the Act does not require [it] to construct network elements . . . for the sole purpose of unbundling those elements for AT&T or other carriers."[12] "Where the facility or equipment does not exist in Verizon's network, it is not used in the provision of a telecommunications service and its not available for unbundling."[13] Likewise, the Commission has found that, when "spare facilities and/or capacity on those facilities is unavailable, Verizon will not provide new facilities solely to complete a competitor's order for high capacity loops." *Pennsylvania 271 Order* ¶ 91. Nothing in the record of this proceeding indicates that Verizon is more accommodating in providing any other network elements to CLECs, or that the other Bells are more accommodating than Verizon.

Not only is Verizon's position poor economic policy, it is unlawful. Allowing incumbents to charge UNE rates that recovered costs of other facilities not used to provide those UNEs – or forcing UNE purchasers to pay all of the joint and common costs of facilities used to provide both capabilities that CLECs can access and those that they cannot – would force

[12] Ex Parte Letter from Ann Berkowitz, Verizon, to Marlene Dortch, FCC, WC Docket No. 02-214, at 1-2 (Oct. 16, 2002).
[13] *Id.*

competitive carriers (as well as their ultimate retail customers) to cross-subsidize other incumbent services in express violation of section 254(k), would be discriminatory in violation of sections 251(c)(3) and 251(d)(1)(A)(ii), and would constitute an arbitrary departure from the Commission precedent holding that "[c]osts must be attributed on a cost-causative basis." *Local Competition Order* ¶ 691.

IV. APPLYING THE TELRIC RULES—SPECIFIC ASSUMPTIONS AND INPUTS

A. Network Assumptions

1. Network Routing And Construction

An efficient carrier would choose the least-cost routes and construction techniques to build its network. It plainly would not merely reproduce the incumbent's existing distribution routes, feeder routes, and/or remote terminal locations without regard to less costly network designs. Klick Reply Decl. ¶ 55; Riolo Decl. ¶¶ 134-141. The ILECs' existing network configurations cannot be presumed to be efficient, particularly in view of their piecemeal deployment and their decades-old engineering designs. *See* AT&T at 56; Klick Reply Decl. ¶¶ 35, 55. As demonstrated above, basing UNE rates on the ILECs' existing network routes and configurations would amount to adopting the discredited "reproduction" cost standard and would inflate UNE rates so substantially that competitive entry would effectively be blocked. *See* AT&T at 56.

Moreover, the ILECs' records are insufficiently accurate or complete even to permit a determination of the forward-looking costs of even their "actual" networks. *Id.* at 56-57; Klick Reply Decl. ¶¶ 43-44. Verizon, for example, while urging a "real-world" approach, tacitly admits that it is incapable of providing information on its "actual" routings and topographies. Verizon at 40; *see also* Klick Reply Decl. ¶ 43. Similarly, while SBC asserts (at 57(that using the ILECs' "real-world" network routing choices would eliminate "speculative modeling assumptions" and "black box speculation," SBC's own cost studies have used the very type of assumptions it criticizes because actual SBC routing data are unavailable. *See* Klick Decl. ¶ 56 (SBC's cost studies assume that all cables are on-half the length of the longest cable in a wire center); *see also* Klick Reply Decl. ¶¶ 43, 51. And that is why the California commission has concluded, "no cost model," including those sponsored by SBC, "appears to be able to replicate *all of the outside plant facilities of the incumbent carrier*" and all "*prior models, and the current* models before the CPUC use assumptions regarding placement of facilities." California at 10-11.

Even if complete and reliable data regarding the ILECs' actual network routing and construction practices were available (and they are not), they would be unlikely to enhance a State commission's ability to determine proper UNE rates. *See* Klick Decl. ¶ 55. As Qwest's own witness states, "[m]odels that attempt to account for each and every nuance of the real world are generally intractable and therefore of little value." Weisman (Qwest) Decl. ¶ 32. At a minimum, to the extent that information regarding the ILECs' "actual" network exists, greater regulatory reliance on such information would put both CLECs and the State commissions at a substantial disadvantage, given the difficulty of verifying whether the information is accurate and complete. *See* Klick Decl. ¶ 51; Klick Reply Decl. ¶ 54; Willig Reply Decl. ¶¶ 55-56; *see also Verizon*, 535 U.S. at 512 (describing ILECs' opportunity to manipulate their data to their advantage).

Cable Routing Algorithm. The Bells' allegation that the CLECs' cost models "ignore" or give "little regard" to natural obstacles, homes, rivers, rights-of-way restrictions and other impediments is pure sophistry. *See* SBC at 57-58; Qwest at 30-31. Precisely the reverse is true. *See generally* AT&T at 57-58; Bryant Essay; Klick Decl. ¶¶ 45-74. CLEC-sponsored cost models go to great lengths to incorporate as much of this information that is reasonably available. Thus, they display an impressive degree of granular detail, and account for the cost effects of varied terrain and obstacles (both natural and man-made), when determining the least-cost, most efficient cable routes. AT&T at 57-58. These models account for local and State variations in terrain, population density, labor costs, and material costs. *Id.*; Klick Reply Decl. ¶ 52.

Indeed, despite their hyperbole, the only specific aspect of the CLECs' cost models that the Bells cite as objectionable is the models' use of a "right-angle routing" algorithm to determine the amount of cable required in a forward-looking network. *See* Qwest at 30-31; SBC at 57-58. Right-angle routing, however, is necessitated by the impracticality and unmanageable cost of accounting for every conceivable detail and feature in the ILECs' network. Because the right-angle routing assumption builds in the extra cable required to route around "real world" obstacles, this assumption is a reliable and conservative approach of estimating cable lengths. *See* AT&T at 58.

The crux of Qwest's attack on right-angle algorithms is their supposed failure to reflect the actual engineering process, or to design distribution along actual roads to serve actual customers. *See* Qwest at 31-32. Qwest misses the critical distinction, for UNE costing purposes, between engineering design and cost attribution. *See, e.g.,* Riolo Decl. ¶¶ 15, 34, 52. A cost model is not designed to reflect engineering principles or to produce maps of precise cable routes, but only to generate reasonable estimates of the total amount of telephone cable that a carrier would be required to deploy in a forward-looking network. As long as a model produces a reasonable estimate of the total amount of the cable needed, and the cost of that cable, the model is TELRIC–compliant. The right-angle algorithm plainly meets this requirement.

Both this Commission and several State commissions have approved the use of right-angle routing as a reliable means of determining cable lengths. Indeed, this Commission uses a right-angle routing algorithm in its TELRIC cost model. *See Inputs Order* ¶ 69. The reason for this regulatory approval is clear: the right-angle routing algorithm is not only reliable, but conservative. If anything, right-angle routing tends to *overstate* the amount of cable (and thus the amount of costs) that is actually necessary to connect customers in the "real world," where cable is run in more direct routes (rather than in the "horizontal, then vertical" path of right-angle routing).[14] That fact is confirmed by real-world experience. For example, in a state UNE rate proceeding CLECs' HAI cost model using the right-angle routing algorithm produced 28 percent *more* distribution cable and 436 percent *more* feeder cable than was produced by the BellSouth's cost model (which maintained highly detailed customer location data and required cable paths to run along roads and other know rights-of-way).[15]

For these reasons, the Commission should reaffirm the current requirement that network routing and construction reflect the least-cost routes and construction techniques. In addition, because the exact routes, construction methods and costs of deploying a network may vary substantially from state to state, the Commission should rule that individual State commissions are in the best position to determine whether the cable placement assumptions of particular TELRIC cost models appropriately reflect the terrain and topography of a particular state. AT&T at 59.

SBC provides no evidence to support its suggestion that a hypothetical competitive firm serving the entire market would incur substantially greater costs than ILECs in obtaining rights-of-way, and there is no basis for assuming the validity of that suggestion. *See* SBC at 57. As explained above, an appropriate application of the contestability standard seeks to determine the prices that an incumbent carrier would charge on the (counterfactual) assumption that there were no barriers to entry. Willig Reply Decl. ¶ 10. Under this framework, the appropriate costs are

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[14] The AT&T letter cited by SBC refutes (at 57-58 & n.90), rather than supports, its position. Ex Parte Letter from Joan Marsh (AT&T) to Marlene Dortch, WC Docket No. 03-173, Att. at 5 (filed October 8, 2003) (stating that as a result of their use of right-angle routing, real geocodes, and census block group-specific terrain data, current TELRIC models "have been conservatively generous in determining plant distances and plant placement costs").

[15] *See* Direct Testimony of Douglas Denny submitted in Arizona Corporation Commission Docket No. T-00000A-00-0194, *supra*, at 27-28.

the costs that the first-mover carrier would incur in efficiently acquiring the necessary rights-of-way. *Id.* ¶¶ 79-81.

2. Line Counts

As AT&T has previously shown, it is critical that all high-capacity loops be included in the calculation of rates for loops that are available as UNEs, so that the forward-looking costs can be accurately calculated, and the costs of shared facilities can be properly assigned among loops that are available to CLECs and those that are not. Such calculation, however, are possible only if the Commission requires ILECs to provide complete line counts, by loop type, by technology, and by central office. *See* AT&T at 59-61; Riolo Decl. ¶¶ 111-33; Klick Decl. ¶ 80.

The Bells fail to address this issue in their comments. In their discussion of discovery issues, Verizon and Qwest suggest a willingness to provide data that arguably encompasses line counts in UNE proceedings under certain conditions. *See* Verizon at 106-107; Qwest at 62. The Commission, however, should expressly require the production of granular line count data in every UNE rate proceeding. The ILECs' exclusive possession of such data, their importance in ensuring that UNE rates fully reflect the economies of scale and scope achieved by the sharing of facilities between two-wire loops and high-capacity loops, and the refusal of some Bells to provide such data in some UNE rate proceedings warrant the issuance of a Commission rule that the ILECs must produce such data. AT&T at 61; Riolo Decl. ¶ 130 & Atts. C-D.

B. Technology Assumptions.

The Bells argue that a forward-looking cost model should not assume the most efficient digital loop carrier ("DLC") technology for fiber-fed loops—*i.e.*, Integrated Digital Loop Carrier ("IDLC") using GR-303 technology. *See* Aron-Rogerson (SBC) Decl. at 20, 26-27; Shelanski (Verizon) Decl. ¶¶ 30, 48; Verizon at 41-42. The *Virginia Arbitration Order*, however, correctly rejected the Bells' contention that their "real-world DLC mix" should be used, *see Virginia Arbitration Order* ¶¶ 310-322, and the Commission should do so here.

The Bells do not dispute that an efficient carrier constructing an efficient forward-looking network would only deploy switches that use GR-303 technology. *Accord*, Klick Reply Decl. ¶ 66 (describing the efficiencies achieved through use of GR-303 switch interfaces). Indeed, the Bells' own witnesses in this proceeding acknowledge that GR-303 would be the most cost-effective technology in a forward-looking network. Aron-Rogerson (SBC) Decl. at 26-27; Shelanski (Verizon) Decl. ¶¶ 30, 48.

Thus, the Bells only argument against assuming IDLC/GR-303 for TELRIC involves the supposed technical limitations of GR-303. First, the Bells assert that it cannot be used to unbundle stand-alone loops. *See* Verizon at 41-42; Aron-Rogerson (SBC) Decl. at 26-27. As the Bureau found, however, in the *Virginia Arbitration Order,* the Bell's arguments regarding the purported technical unfeasibility of unbundling IDLC with GR-303 technology is contradicted by: (1) the admission of Verizon's own witness in that proceeding "that Verizon has had the technical ability to provide unbundled next generation digital loop carrier ("NGDLC") loops for *four to five years*, but chose not to implement a standard offering because competitive carriers had not sufficiently pursued such an offering," and (2) the fact that "BellSouth, in its section 271 applications, repeatedly informed the Commission that it unbundles loops that traverse NGDLC and GR-303/IDLC systems, thereby demonstrating that such unbundling is technically feasible and currently available." *Virginia Arbitration Order* ¶ 315 & n.819 (emphasis in original).

The technical feasibility of unbundling IDLC-based loops using GR-303 is further confirmed by Telcordia's Notes on the Networks. Although Verizon insists that Telcordia has not resolved the technical issues and challenges of unbundling loops using GR-303, Verizon at 42, Telcordia has concluded otherwise. Telcordia, in updating its SCIS model, decided that TR-

08 was not a forward-looking technology for use with Lucent's SM2000 switch module, and instead modeled *only* GR-303 technology with the Lucent switch. Thus, when Verizon chose the Lucent SM2000 switch module as its forward-looking technology to model switching costs in the *Virginia Arbitration* proceeding, the SCIS model it sponsored did not recognize TR-08.[16]

Verizon's claim that IDLC/GR-303 cannot be used to provision non-switched services is equally wrong. *See* Verizon at 41. Verizon's own 2000 planning guidelines state explicitly that growth in its Verizon West network will be based on GR-303 NGDLC. *Virginia Arbitration Order* ¶ 317 & n.821. Equally unavailing is Verizon's suggestion that unresolved network security and OSS issues regarding GR-303/IDLC unbundling preclude the deployment of IDLC/GR-303 in the forward-looking network. Verizon at 42. As the *Virginia Arbitration Order* found, Verizon's assertions regarding network security issues are a red herring, because Verizon must have resolved any such security concerns before it deployed GR-303 in its Verizon West region, where "GR-303 systems are used for growth." *Virginia Arbitration Order* ¶ 320.

Verizon suggests that the difficulties in developing OSS for unbundling are somehow insurmountable, Verizon at 42, but "[d]eveloping and implementing such systems is within Verizon's control," as it was when Verizon was first required to provide an unbundled loop but the OSS to do so did not exist.[17] Verizon was able to resolve OSS issues for its back-end systems once it decided to deploy GR-303 outside the context of unbundled loops.[18] The salient inquiry, however, is not whether the ILECs have already developed the OSS to support

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[16] *See* Telcordia Notes on the Networks (October 2000), Section 12, Figure 12-35 (available at http://telecom-info.telcordia.com/site-cgi/ide/index.html); Supplemental Surrebuttal Testimony of Catherine E. Pitts in *Virginia Arbitration* proceeding, at 6-7; *Virginia Arbitration* proceeding, Tr. at 2850 (Matt).

[17] *Virginia Arbitration Order* ¶ 321. *See also* Rebuttal Testimony of Michael L. Baranowski, Catherine E. Pitts, Joseph P. Riolo, and Steven E. Turner in *Virginia Arbitration* proceeding, at 29-30.

[18] *See Virginia Arbitration* proceeding, Tr. at 4587 (Gansert).

IDLC/GR-303 unbundling, but rather "whether the technology is 'currently available.'" *Virginia Arbitration Order* ¶ 321. A process or function may be "technically feasible" within the meaning of the *Local Competition Order* even if its implementation "may require *some modifications to existing systems.*" *See id.* (emphasis added); *Local Competition Order* ¶¶ 524-525 (emphasis added).

The reality is that the ILECs have elected to deploy relatively little IDLC/GR-303 in their existing networks simply because the ILECs' investment decisions are influenced by the sunk nature of their embedded switch investment. *See* Willig Reply Decl. ¶¶ 43-45. The Bells themselves admit this fact. *See* Shelanski (Verizon) Decl. ¶ 30; Aron-Rogerson (SBC) Decl. at 20. Until this investment reaches the end of its useful life, the ILECs have no incentive to make the necessary modifications and take any other steps necessary to achieve GR-303 unbundling—even if the resolution of such issues would be readily achievable and in the overall interest of competitors and ratepayers generally. In fact, as long as the ILECs can argue for higher UNE prices on the ground that GR-303 unbundling is not yet available, they have every incentive to delay the development of OSS to support such unbundling as long as possible.

C. Loop Cost Inputs

1. Fill Factors.

Beneath the Bells' rhetorical flourishes, the true nature of the Bells' fill factor proposals is clear. The Bells entreat the Commission to require State commissions to adopt incumbents' embedded fill factors in determining loop costs—fill factors that do not and cannot represent the optimal utilization rates of an efficient carrier in a forward-looking network. *See* Riolo Reply Decl. ¶¶ 13-47.

As AT&T has explained, the ILECs' embedded fill factors cannot possibly approximate the fill utilization rates that an efficient carrier would achieve in the long-run because, *inter alia*:

(1) rate of return regulation gave incumbents strong incentives to build excessive amounts of spare capacity in their networks; (2) the incumbents' networks are a patchwork of numerous feeder routes and plant of many vintages, much of it built to meet future growth that never materialized; (3) the incumbents' networks include distribution areas in central business districts that are overbuilt as a result of the incumbents' unsuccessful efforts to market Centrex-type services to business customers; (4) the incumbents' existing networks were constructed with engineering techniques and technologies that are now obsolete; and (5) the incumbents maintain less efficient DLC equipment in their networks, instead of GR-303 compatible DLC equipment that allows higher utilization rates. Riolo Decl. ¶¶ 36-52; *see also* Willig Decl. ¶¶ 82-89. Nothing in the Bells' comments alters these conclusions.

Churn, Maintenance and Breakage. The Bells' contention that their embedded fill factors are efficient because they are the product of "real-world constraints" such as churn, maintenance, and breakage is baseless. *See* AT&T at 62-64; Riolo Reply Decl. ¶¶ 17-20. Relatively modest amounts of spare capacity are required to accommodate customer churn because: (1) most churn essentially is self-canceling; (2) even when a location is vacated, the line is still active for a limited period and is treated as cut-through pairs in the fill ratio; and (3) where churn theoretically could result in short-term demand fluctuations (*i.e.* ordering additional residential lines in existing locations), demand is decreasing as customers increasingly rely on a single telephone line for both telephone and broadband service. AT&T at 62; Riolo Reply Decl. ¶ 19.

In a forward-looking network, the spare capacity required for maintenance of defective equipment is also modest. As AT&T has shown, the embedded networks of the Bells may contain nontrivial amounts of defective pairs. Riolo Decl. ¶ 26. However, equipment currently produced by manufacturers has failure rates that are close to zero, and an efficient new carrier would not construct plant expecting the same high levels of defective plant as may exist in the Bells' embedded networks. Riolo Reply Decl. ¶ 20. Furthermore, a contestable market simply would not permit an incumbent to recover the costs of any higher equipment failure rates from ratepayers. AT&T at 63. Accordingly, UNE rates should not be calculated based upon such inefficiencies. *Id.*

Breakage—the manufacturing constraints that limit cable to discrete sizes—is accommodated in TELRIC models by first rounding up the required number of wire pairs or fiber strands to the next available discrete size. Thus, modern cost models appropriately assume the purchase of cable sizes that have ample capacity and are actually available for purchase. Riolo Decl. ¶ 30. Moreover, the spare capacity attributable to breakage is often sufficient to accommodate the relatively modest amounts of spare capacity that are required for churn and maintenance.

Growth and Cost Attribution. The Bells' contentions that the large amounts of spare capacity reflected in their actual fill rates are required to accommodate future growth—and that current ratepayers should pay for all such spare capacity—are demonstrably unsound. The Bells have offered no justifiable reason why current ratepayers should be required to subsidize the *future* ratepayers on whose behalf the future growth spare capacity is built. In fact, attributing to current ratepayers the costs of growth capacity, whether efficient or not, would violate principles of cost causation and intergenerational equity. AT&T at 64-65; *cf.* Willig Decl. ¶¶ 88-89. As this Commission has found, "if we were to calculate the costs of a network that would serve all potential customers, it would not be consistent to calculate the cost per line by using current demand. In other words, it would not be consistent to estimate the cost per line by dividing the total cost of serving all potential customers by the number of lines currently served" today. *Universal Service Order* ¶ 58. Even Verizon witness Alfred Kahn has agreed:

> We have already posed the question of the proper rate [of depreciation] when a plant is built far in advance of total need — perhaps because there are great economies of scale. To charge depreciation in equal annual installments would be to impose a disproportionately heavy burden on customers in earlier years, when much of the capacity lies idle. Considerations of fairness — the idle capacity is really for the benefit of future, not present customers -- and economic efficiency present a case for something similar to SRMC pricing, which would have the effect of concentrating the capital charges in later years.

I Alfred Kahn, THE ECONOMICS OF REGULATION 121 (1970).

Verizon's rejoinder that that no portion of spare capacity costs should be recoverable from "future users" rather than current ratepayers because "on average" utilization in the network "remains stable over the long run," Verizon at 46, is simply a reprise of the argument that the *Virginia Arbitration Order* properly rejected.

Verizon confuses the average utilization of the network *in the aggregate* with the utilization of *individual* loops, serving areas or other subcomponents of the network — the level of aggregation at which Verizon makes plant-sizing decisions and offers discrete units of capacity for sale to CLECs and other ratepayers. Riolo Reply Decl. ¶ 25. At that disaggregated level, Verizon clearly sizes its plant with the expectation that demand will tend to increase over time, and that capacity utilization *for a given set of facilities* will tend to trend upward until the capacity is augmented. When a previously idle loop is eventually brought into revenue-generating service by increased demand, the future new customer receives no credit for whatever contribution that prior ratepayers may have made to the cost of that loop when it was merely idle capacity. Hence, there is no conceivable argument for charging today's customers for spare capacity dedicated to future revenue-generating services. "Just as the Commission found it inappropriate to include in universal service support the costs of building outside plant to meet uncertain ten- or twenty-year demand projections, it is inappropriate for [the CLECs] to bear the cost today of building plant for uncertain ultimate demand." *Virginia Arbitration Order* ¶ 254.

Further, quantification of the specific carrying costs and future revenues from growth capacity is far too "speculative." *Notice* ¶ 73.

Finally, even if it were assumed (counterfactually) that the costs of spare capacity for future growth should be borne by current ratepayers, the amount of growth capacity would need to be discounted substantially, for the magnitude of growth capacity for lines available as UNEs is likely to approach zero or the negative for the foreseeable future. Riolo Decl. ¶ 23; Riolo Reply Decl. ¶ 27.

Engineering Guidelines. The Bells also cannot properly seek refuge in their engineering guidelines as a basis for justifying the excessive levels of spare capacity in their networks. The Bells contend that the engineering guidelines impose inflexible requirements for capacity to which Bell engineers slavishly adhere. In fact, the Bell engineering guidelines leave engineers considerable discretion in determining optimal plant capacity, and sound industry engineering practices encourage the maximization of outside plant to the greatest extent possible. Riolo Decl. ¶ 57; Riolo Reply Decl. ¶ 29. Finally, as explained above, even to the extent that these guidelines would have the incumbent reserve significant spare capacity for growth, such excess capacity should not be charged in the UNE rates paid by current users. Willig Decl. ¶¶ 88-89.

Stability of Fill Levels. The Bells' argument that the stability of their embedded fill levels demonstrates the efficiency of their networks borders on the frivolous. *See, e.g.*, Verizon at 44-45; BellSouth at 27. Even assuming *arguendo* that the Bells' fill levels have remained "stable," that "stability" simply demonstrates the *inefficiencies* of their current fills -- and the ineffectiveness of price caps and other factors that the Bells contend cause them to be efficient. If anything, given the low levels of fill in the Bells' current networks, the fact that fill levels have remained "stable" confirms that the Bells are installing far too much capacity in their networks. Riolo Reply Decl. ¶ 31.

Verizon's comments illustrate this precise point most starkly. Verizon contends that the spare capacity in its network is both "stable" and efficient because "as existing spare units of capacity are placed into service in various parts of the network, new capacity is being added to other parts of the network constantly." Verizon at 46. Implicit in Verizon's argument is the notion that an efficient carrier automatically adds capacity to its network whenever it places previously unused facilities into service. This assumption is incorrect. An efficient carrier would not mindlessly augment its network each time it places previously unused capacity into service, as Verizon suggests, but rather would seek to allow utilization to increase to the maximum feasible extent to avoid the costs of needless idle capacity. Thus, Verizon's admission that its spare capacity remains "stable" because it augments the network whenever unused capacity is placed into service merely confirms that Verizon's utilization rates are demonstrably inefficient. *See* Verizon at 46; Riolo Reply Decl. ¶ 32.

Price Caps, Competition, and Service Quality. Equally flawed are the Bells' arguments that price caps, facilities-based competition, and service quality standards provide strong incentives to maintain optimally efficient fills and minimize excess capacity. *See, e.g.*, Shelanski (Verizon) Decl. ¶¶ 51-52; SBC at 4-5. As discussed in Section II.B above, the notion that price cap regulation has created effective incentives for the Bells to optimize their utilization rates is absurd. Price cap regulation did not eliminate the Bells' incentive to deploy excess capacity, for price cap regulation is plagued with exceptions and loopholes; and, even if effective, would not eliminate the strategic value of maintaining underutilized sunk plant capacity. Likewise, for the reasons discussed above, the ILECs' "actual" fills cannot be presumed efficient because of existing competition. *See* SBC at 68-69; Verizon at 19-24, 45. And even if, as the Bells suggest, fill levels were likely to *decrease* in the future from intermodal competition, Verizon at 45, considerations of efficiency would dictate that the Bells decrease their costs per line by *increasing* their current fills – rather than keeping them stable – and reducing the current amount of spare capacity in their networks. *See* Riolo Reply Decl. ¶ 39; Klick Reply Decl. ¶ 7.

The Bells' arguments that service quality standards give them "strong incentives to design and operate their networks with efficient levels of spare capacity" (SBC at 5), and that service quality would deteriorate if they operated at rates higher than their embedded fill levels are equally misguided. SBC at 66; Verizon at 44 n.84. First, service quality requirements and performance metrics specify no minimum, or maximum, levels of spare capacity that the ILECs must maintain. Riolo Reply Decl. ¶ 41. Instead, they establish parity or benchmark standards for other aspects of performance that the ILECs must meet. Thus, a carrier with plainly excessive spare capacity could satisfy the Indiana standards cited by SBC (completion of 90 percent of installation orders within 5 days and generation of fewer than 10 trouble reports annually per 100 lines). *See* SBC at 68.

Second, the Bells have provided no empirical data to support their bald assertion that the operation of a network with fill levels higher than their embedded fill rates would result in a loss of efficiency and degradation of service. *See, e.g.*, Verizon at 44 n.84; SBC at 66, 68. In the absence of such analysis, the Bells' arguments are nothing more than empty rhetoric. And, as AT&T has shown, even at relatively high fill levels, a carrier has sufficient spare capacity to satisfy current demand. Riolo Reply Decl. ¶ 42.

COLR Obligations. Contradicting their claims that incumbent networks are the models of efficiency, the Bells contend that they are required to maintain lower utilization rates than they would otherwise maintain because of their COLR obligations. Verizon at 45; SBC at 67-68; BellSouth at 8; NERA (BellSouth) Decl. ¶¶ 22-25. However, the Bells' reliance on their status as "carriers of last resort" is nothing more than a variant of their discredited claim that fill factors should be based on ultimate demand. Riolo Decl. ¶ 67. Furthermore, as noted above, the Bells' submissions are bereft of any evidence to support the notion that State commissions are somehow requiring the Bells to maintain the bloated levels of spare capacity in their networks. And, even assuming *arguendo* that the Bells' assertions are true, these costs should be recovered through the universal service contribution fund, rather than wholesale UNE rates. Riolo Reply Decl. ¶ 44.

Transparency. Perhaps recognizing the bankruptcy of their justifications for their current low fills, the Bells assert that the use of actual fills has the added virtue of promoting "predictability" and greater accuracy in cost calculations. SBC at 69. Nothing could be further from the truth. The mechanical application of the incumbents' pathetically low embedded fills would simply result in overly inflated UNE rates which reflect the inherent inefficiencies that persist in the Bells' networks. Nor is it true that the use of reported embedded fills will spawn greater accuracy in cost calculations than the Commission's TELRIC rules. The inherent unreliability of the Bells' distribution plant records, coupled with the flawed methodology they use when measuring fills in their networks, demonstrates the absurdity of any suggestion that the Bells' reported embedded fill levels accurately depict their actual utilization rates. Riolo Decl. ¶¶ 50-51; Klick Decl. ¶¶ 62-67; Riolo Reply Decl. ¶ 46.

Worse yet, the use of the ILECs' reported embedded fill factors would render UNE cost calculations less verifiable. Because the ILECs are the only entities that possess data on their embedded utilization rates, CLECs and regulators would be placed at a considerable disadvantage in verifying the ILECs' data. And because of the asymmetry of available information, the incumbents have every incentive to manipulate the data to suit their purposes. *See* AT&T at 29-30; Riolo Reply Decl. ¶ 47. Thus, reliance on the incumbents' low embedded fill factors would not only generate costs well in excess of those required to serve current demand efficiently, but it would also place CLECs (as well as regulators) at a significant informational disadvantage without improving the accuracy of TELRIC calculations. *See* AT&T at 39.

2. Structure Sharing.

Each of the Bells asserts that loop prices should reflect the Bells' "actual," embedded structure sharing percentages. *See* BellSouth at 26; SBC at 62; Verizon at 48; Qwest at 34 (arguing that embedded percentages are the best evidence of the level of sharing that is achievable in a forward-looking network). The Bells do not seriously dispute that they have substantial opportunities for sharing of aerial structure, but rather contend that opportunities to share buried and underground structure in the forward-looking network would be virtually nonexistent. *See* BellSouth at 26; Verizon at 47. The Bells' arguments are demonstrably unsound.

The incumbents' "actual" (*i.e.* embedded) sharing percentages are not a suitable proxy for efficient forward-looking sharing percentages. There were fewer sharing opportunities in the past; and incumbents and other regulated monopolists had little incentive to take advantage of such opportunities since such sharing would have reduced the underlying rate base on which their rates of return were computed and facilitated competitive entry by lowering CLEC operating costs. Riolo Decl. ¶¶ 81-82; *cf.* Selwyn Decl. ¶¶ 18-20; Willig Decl. ¶ 95. Thus, the incumbents' actual embedded sharing percentages substantially understate the degree of sharing that will exist in a forward-looking network. Moreover, use of embedded sharing percentages would send improper cost signals to the incumbents, and could spawn inefficient investment decisions going forward. Willig Decl. ¶ 95. If incumbents are permitted to recover costs based on their low embedded structure sharing percentages, they will have even less incentive to take advantage of sharing opportunities in the future. *Id.*

The Bells' argument that structure sharing is not feasible because existing structure has already been built is self-contradictory. *See* Riolo Reply Decl. ¶ 51. The incumbents' argument is based upon a short-run perspective. AT&T at 10. If, however, structure sharing opportunities are to be evaluated over the short-run, so too must the unshared cost of the structure. Because most investment in support structure is sunk once made, the short-run incremental cost of support structure is close to zero. The incumbents cannot have it both ways. They cannot endorse a methodology that allows them to use short-run costing assumptions where they produce higher costs, and simultaneously advocate long-run cost assumptions where *they* produce higher costs. *See* AT&T at 43; Riolo Reply Decl. ¶ 51; Klick Reply Decl. ¶ 25.

In the long run—the time horizon encompassed in TELRIC—there are today, and will be in the future, substantial opportunities for the sharing of buried and underground structure. Riolo Reply Decl. ¶ 52. In this regard, SBC's assertion that there are "complications . . . to sharing that make it limited even in new developments" is simply contrary to the facts. SBC at 62 n.94. In new residential developments, developers typically provide, free of charge, the trench and structure within which the facilities of telecommunications carriers are placed. Riolo Decl. ¶ 91.

Moreover, the Bells cannot legitimately contend that there are no opportunities for sharing even in the short and medium run. Even in existing developments, there are today, and will be in the future, substantial opportunities for the sharing of costs with utility companies, developers, municipalities, and CLECs. For example, power companies regularly rebuild or replace their facilities, CATV companies are constantly upgrading their networks, and road widenings often require companies that share space on poles to move their facilities underground. Riolo Reply Decl. ¶ 52.

The Bells' claims that buried and underground structure sharing is extremely limited because the construction plans of other utilities do not coincide precisely in terms of time and location with those of the incumbents are equally specious. *See* Verizon at 47. The Bells' arguments are belied by: (1) the plethora of ordinances, codes, regulations which strongly encourage or require structure sharing and require utilities to provide advance notice or forecasts of proposed excavation to facilitate such coordination; and (2) the incumbents' own memberships on utility coordinating committees that are designed to facilitate the coordination that they now claim is impossible to achieve. Riolo Decl. ¶¶ 94-101; Riolo Reply Decl. ¶¶ 53-57.

Verizon cites one installation project—the Georgetown Project—as the quintessential example of the prohibitively high costs of coordination in structure sharing arrangements. Verizon claims that, "in part" due to coordination, the per-unit installation costs of the Georgetown Project exceed its costs in other projects where it is the only carrier involved. Verizon at 47. Conspicuously absent, however, from Verizon's comments is any empirical analysis quantifying the installation costs attributable to coordination as opposed to other causes, or any data showing how the nature, scope, and costs of the Georgetown Project compare to the unidentified other excavation projects to which Verizon refers. Accordingly, Verizon's unsupported, self-serving assertions should be accorded no weight for this reason alone. Riolo Reply Decl. ¶ 59.

Even assuming *arguendo* that Verizon's installation costs in the Georgetown Project have exceeded those in other projects where Verizon was the lone utility, the increased costs for the Georgetown Project could well be due to the unique working conditions, as well as the suboptimal weather, that the participants faced during the excavation process. In this regard, the Georgetown Project is an "unprecedented" renovation of the underground utility system that is being implemented by Washington Gas, the District of Columbia Water and Sewer Authority, PEPCO, Verizon and the District of Columbia Department of Transportation in Georgetown — a densely populated district, crowded with residential and commercial structures, that attracts 17 million visitors annually. Riolo Reply Decl. ¶ 60. To minimize the impact of construction, work hours are limited to weekday nights, and no work is conducted on weekends or during holiday moratoriums. *Id.* In addition, because of the unusually high levels of precipitation and inclement weather that the Washington area experienced, work on the project was suspended for 48 days in 2003. *Id.* ¶ 61.

Remarkably, notwithstanding all of these challenges, Verizon, as well as public officials, have heralded the Georgetown Project as a resounding success. Indeed, Verizon's assertion in this proceeding that the Georgetown Project is a prime example of the insurmountable problems of coordination simply cannot be credited since: (1) Verizon serves on the Executive Management Committee which is responsible for coordinating the work on this project; and (2) the Executive Management Committee has publicly admitted that the project has run "smoothly" because of the high level of cooperation among the participants. *See* Riolo Reply Decl. ¶ 62.

Similarly, Jack Evans, a member of the District of Columbia City Council who represents Ward 2, in which Georgetown is located, has stated publicly that the "exemplary" "cooperation" among the participants in the Georgetown project has "made this unprecedented project a success."[19] And, notably, the Executive Management Committee of the Georgetown Project received the 2003 Team Excellence Award for Exemplary Partner from the American Association of State and Highway Transportation Officials ("AASHTO") because of the success of this $40 million coordinated project. Riolo Reply Decl. ¶ 62. In explaining why the

[19] *See* Councilmember Jack Evans Weekly Newsletter, Week of October 17, 2003 (congratulating the municipal agencies and "the utility companies for their dedication and commitment to making this unprecedented project a success" and noting that "[t]he level of cooperation between the six different entities has been exemplary and the Project is very deserving of such an honor in recognition of their hard work.") http://www.dccouncil.washington.dc.us/EVANS/newsletter/Week.of.10.17.03.htm.

Georgetown project was worthy of such special recognition, the AASHTO stated that the Executive Management Committee "coordinate[d] and combine[d] the individual projects [of the participants] into one massive effort," and that "the parties' cooperative effort condensed 10-15 years of proposed consecutive utility and DDOT upgrades into one project scheduled for completion within four years."[20] Thus, although Verizon attempts to portray the Georgetown Project as an archetypal example of the insurmountable difficulties associated with coordination, the public record shows precisely the opposite. Riolo Reply Decl. ¶ 63.

The Bells' remaining claims are vastly overblown. Security cannot be a major concern as the incumbents often implement such arrangements – such as the placement of fences or warning indicators around excavated areas – even when they are constructing their own facilities independently. *See* SBC at 62 n.94; Riolo Reply Decl. ¶ 65. The increased precautions necessary when construction is shared are modest. Riolo Reply Decl. ¶ 65. Nor are safety concerns an impediment to sharing. Verizon at 47 (claiming such considerations "preclude placing electrical cable in the same trench with telephone cables"). There is no such prohibition in the industry. Under longstanding industry practice, electrical cable and telephone cable may be placed in the same trench, as long as the cables are separated by a minimum distance. Riolo Reply Decl. ¶ 65.

3. Structure Mix.

True to form, the Bells contend that their embedded plant mix is a reasonable proxy for the structure mix of an efficient carrier in a forward-looking network. Qwest at 36; SBC at 5, 63; Verizon at 46. This argument is meritless.

The appropriate mix of aerial, buried, and underground plant that an efficient carrier will deploy in a forward-looking network depends upon a variety of factors, including: whether the

[20] 2003 AASHTO Excellence and Innovation Awards Program at 7, Riolo Reply Decl. Att. 1.

cable is feeder or distribution; population density; labor costs; material costs; topography; zoning rules; municipal requirements; and engineering practices. Riolo Reply Decl. ¶ 67. In a forward-looking network, an efficient new entrant would build outside plant in the least-cost, most efficient manner. *Id.* The incumbents' embedded outside plant mix is not forward-looking because it is constrained by the technologies, materials, tools, and manufacturing processes that were available at the time of plant deployment and does not reflect current best practices. Riolo Reply Decl. ¶¶ 68-69. Indeed, much of the ILECs' embedded outside plant was deployed before the development of Long Range Outside Plant Plans, which standardized and formalized the outside plant planning process and delineated the myriad factors that engineers should consider to make informed decisions about the appropriate composition of outside plant in the network. Riolo Reply Decl. ¶ 68. As a consequence, the embedded outside plant mix in the incumbents' existing networks reflects *ad hoc* decisions by various engineers that would not mirror the plant mix decision that an efficient new carrier would make today. *Id.*

The Bells' assertion that use of "actual" embedded outside plant mix data will yield greater accuracy in TELRIC calculations is pure fantasy. *See, e.g.*, SBC at 59, 62. There is absolutely no basis for assuming that the supposedly "actual" outside plant mix percentages submitted by the Bells in UNE rate proceedings accurately reflect their actual embedded outside plant mix. Riolo Reply Decl. ¶ 71. As AT&T pointed out in its opening comments, when the Bells started automating their systems in the 1990s, the only available outside plant records were unreliable and inaccurate. Klick Decl. ¶¶ 62-63. And even when the Bells have conducted outside plant surveys purportedly to obtain accurate information regarding their networks, the survey results have been plagued with errors. Riolo Reply Decl. ¶ 71.

For example, in a number of UNE rate proceedings, Verizon has relied upon a structure mix that was purportedly extrapolated from the results of an engineering survey conducted by its outside plant engineers in the early to mid-1990s. Riolo Reply Decl. ¶ 72. The survey instructions, which directed respondents to describe the "predominant" structure used for feeder and distribution cable within each Ultimate Allocation Area ("UAA"), invited respondents to hazard nothing more than guesses regarding "the most likely type of structure that the next proposed cable will require." *Pennsylvania UNE Proceeding*, Verizon Stmt. 1.1 (Recurring Cost Panel Sur.), Attachment G at 4. If, on the basis of subjective judgment, an engineer "believe[d] that the predominant structure mix was underground, the survey recorded that 100% of the structure in the particular UAA was, in fact, underground structure." *Virginia Arbitration Proceeding*, Tr. 4144-4145. The survey default also treated *all* distribution structure as buried whenever the survey respondent failed to specify the so-called "predominant" distribution structure type. *Pennsylvania UNE Proceeding*, AT&T/WCOM Stmt. 3.1 (Riolo Sur.) at 16-17. Because the documents underlying the survey no longer exist, it is impossible to verify the full extent to which the survey results depart from Verizon's actual structure mix. Riolo Reply Decl. ¶ 72. The Pennsylvania commission found that "Verizon's survey contains flaws in methodology which cause us to question its reliability for the purposes of establishing a proper, forward-looking, outside plant mix." *Pennsylvania UNE Order* at 117.

4. Placement Costs.

Plant placement costs are a function of a number of factors, including network routing and labor costs. An efficient carrier in a forward-looking network would select the least-cost routes and construction techniques. Riolo Reply Decl. ¶ 76. In contrast, the incumbents' embedded placement costs are not forward-looking because they are substantially constrained by the incumbents' existing networks. *Id.* Thus, for example, the embedded networks contain substantial numbers of copper wires that were spliced together by twisting two wires together by hand — a slow and costly procedure. In stark contrast, an efficient new entrant can accomplish the same task by using a connector that accepts 25 copper pairs at a time, thereby substantially reducing the time and costs associated with the wire joining/splicing function. *Id.* ¶ 77. Similarly, reliance on the ILECs' embedded replacement costs would reflect their historical practice of installing poles on a piecemeal basis, resulting in costs that are higher than those that are incurred when pole installations are planned in advance. *Id.* ¶ 78. The unit costs of such piecemeal placements fail to reflect the scale economies available from the large-scale installation jobs that an efficient new entrant would undertake. *Id.*

For these very reasons, the *Virginia Arbitration Order* rejected Verizon's embedded aerial structure investment input data, finding that "Verizon's approach . . . probably overstates costs because it includes all of Verizon's small/individual replacement jobs. . . . and much of the recent investment in poles is due to small/individual pole placement jobs." *Virginia Arbitration Order* ¶ 300. Significantly, Verizon admitted during that proceeding that the average number of poles per job in 1999 and 2000 was less than 1.4. *Id.* Similarly, the Pennsylvania commission has rejected Verizon's embedded pole investment costs, finding that Verizon's embedded costs are "not representative of what would be achieved in a forward-looking network." *Pennsylvania UNE Order* at 125-126.

There are other significant problems with using the ILECs' "actual" placement costs in calculating UNE rates. Placement costs can vary depending upon any number of factors, including geography, labor and material costs, terrain, population density, and the characteristics of the cables and supporting structures. Bryant Essay at 3. However, the accounting records maintained by the Bells, which are notoriously unreliable, do not capture geographic cost differences and otherwise lack the detailed granular information necessary to determine placement costs. Riolo Decl. ¶ 84.

SBC contends that forward-looking placement assumptions allow "gamesmanship" *e.g.*, through the assumption of "cheap placement methods (such as 'plowing') in modeling the costs of laying cable in highly developed areas, even though no real-world carrier could ever hope to 'plow' and then 'backfill' a paved city street." SBC at 60, 62. This argument is baseless.

TELRIC models account realistically for an impressive array of conditions that affect placement costs. Bryant Essay at 11-12. As AT&T has explained, the HAI model, for example, determines placement methods based on a variety of factors, including topography, zoning restrictions, and best engineering practices. AT&T at 57. The HAI model also accounts for the cost effects of terrain by recognizing that excavation of streets and boring through concrete are more expensive than using aerial or buried structure. Modern TELRIC models also account for other factors such as population density, labor, and material costs that can vary by state and locality. Klick Decl. ¶¶ 45-74. SBC identifies nothing in the algorithms of these models that would assume the plowing of city streets.

Equally unfounded is Qwest's contention that state regulators, including the Arizona commission, have erroneously endorsed a "time machine approach" that assumes that all cable was placed prior to the existence of streets, sidewalks, and landscaping in Arizona. Qwest at 36. In the Arizona proceeding cited by Qwest, the carrier assumed that a high percentage of the cable in rural and suburban areas of Arizona would require the excavation and restoration of streets and sidewalks, as well as landscaping. As the Arizona commission Staff pointed out, Qwest's assumptions were entirely unrealistic.[21] In the most rural areas of Arizona, there are few, if any, asphalt roads or concrete sidewalks that cannot be avoided, and there is virtually no landscaping.

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[21] *See* Response Br. on the Merits, *Qwest v. ACC*, Case No. CIV-02-1626 PHX-SRB, at 17-18 (D.Ct.Az., filed Feb. 28, 2002).

And, even in suburban areas, buried cable can be placed in dirt along side roads. The Arizona commission ultimately determined that Qwest's inputs for buried cable "overstate the costs attributable to placement of cable in a forward-looking environment," and that "the HAI model relies on . . . reasonable assumption[s]." *Arizona UNE Order* at 12. This finding was clearly well founded.

D. Switching Costs

Growth Discounts. An efficient carrier installing a network today—or any firm viewing costs from a long-run perspective—would use new switches to serve all current demand and at least some expected future demand, and would purchase relatively few growth lines. The proper forward-looking costing approach is to account for new and growth lines using a proper "life cycle" cost for switching investment. Using an input for switch costs that takes into account the life cycle of the switch, with new switches at new switch discounts and growth equipment at lower growth discounts, conforms to the TELRIC pricing standard. Murray/Pitts Decl. ¶¶ 16-38; Murray/Pitts Reply Decl. ¶ 3.

The alternative costing approach advocated by the Bells—applying the unit cost of the switching equipment they have bought recently or expect to buy within the next few years to their entire inventory of switching capacity—is utterly illegitimate. *See, e.g.*, Verizon at 48-53; BellSouth at 28-29; SBC at 70-73. These purchases reflect the carriers' substantial sunk investment in existing switching equipment, and therefore are weighted heavily on growth equipment, which is considerably more costly on a per-line basis. The cost estimates generated by this approach would exceed long run incremental cost, short run incremental cost—and even the Bells' embedded costs. Murray/Pitts Reply Decl. ¶¶ 5-12.

The long run incremental costs of switching capacity, as noted above, would be those of a new entrant or other firm unconstrained by sunk investment in existing equipment, and thus